

General

Guideline Title

ACR Appropriateness Criteria® dysphagia.

Bibliographic Source(s)

Carucci LR, Lalani T, Rosen MP, Cash BD, Katz DS, Kim DH, Small WC, Smith MP, Yaghmai V, Yee J, Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® dysphagia. [online publication]. Reston (VA): American College of Radiology (ACR); 2013. 10 p. [42 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Jones B, Gayler BW, Rosen MP, Blake MA, Baker ME, Cash BD, Fidler JL, Grant TH, Greene FL, Katz DS, Lalani T, Miller FH, Small WC, Sudakoff GS, Warshauer DM, Yee J, Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® dysphagia. [online publication]. Reston (VA): American College of Radiology (ACR); 2010. 6 p.

Recommendations

Major Recommendations

ACR Appropriateness Criteria®

Clinical Condition: Dysphagia

Variant 1: Oropharyngeal dysphagia with an attributable cause.

Radiologic Procedure	Rating	Comments	RRL*
X-ray barium swallow modified	8		☼☼☼
X-ray pharynx dynamic and static imaging	6		☼☼☼
X-ray biphasic esophagram	4	Perform this procedure with double contrast and single contrast.	☼☼☼
X-ray barium swallow single contrast	4		☼☼☼
Technetium (Tc)-99m transit scintigraphy esophagus	2		☼☼☼
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative

Radiologic Procedure	Rating	Comments	Radiation Level

Variant 2: Unexplained oropharyngeal dysphagia.

Radiologic Procedure	Rating	Comments	RRL*
X-ray pharynx dynamic and static imaging	8	In this procedure both pharyngeal and esophageal examinations are needed since the patient may have referred dysphagia.	☢☢☢
X-ray biphasic esophagram	8	In this procedure both pharyngeal and esophageal examinations are needed since the patient may have referred dysphagia. Perform this procedure with double contrast and single contrast.	☢☢☢
X-ray barium swallow modified	6		☢☢☢
X-ray barium swallow single contrast	6		☢☢☢
Technetium (Tc)-99m transit scintigraphy esophagus	4		☢☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Variant 3: Retrosternal dysphagia in immunocompetent patients.

Radiologic Procedure	Rating	Comments	RRL*
X-ray biphasic esophagram	8	Endoscopy and biphasic esophagram are both excellent diagnostic tests in this setting.	☢☢☢
X-ray barium swallow single contrast	6	This procedure is probably indicated if the patient is not capable of doing anything except swallowing.	☢☢☢
X-ray barium swallow modified	4		☢☢☢
X-ray pharynx dynamic and static imaging	4	Esophageal examination is also necessary.	☢☢☢
Technetium (Tc)-99m transit scintigraphy esophagus	4		☢☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Variant 4: Retrosternal dysphagia in immunocompromised patients.

Radiologic Procedure	Rating	Comments	RRL*
X-ray biphasic esophagram	8	Endoscopy and biphasic esophagram are both excellent diagnostic tests in this setting.	☢☢☢
X-ray barium swallow single contrast	5		☢☢☢
X-ray barium swallow modified	4		☢☢☢
X-ray pharynx dynamic and static imaging	3	Esophageal examination is also necessary.	☢☢☢
Technetium (Tc)-99m transit scintigraphy esophagus	2		☢☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative

Radiologic Procedure	Rating	Comments	Radiation Risk Level
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Summary of Literature Review

Introduction/Background

According to *Stedman's Medical Dictionary* and *Dorland's Medical Dictionary*, "dysphagia" is defined as "difficulty in swallowing." Dysphagia is also a symptom, defined as the "subjective awareness of swallowing difficulty during passage of a liquid or solid bolus from the mouth to the stomach." As a symptom, it is usually indicative of an abnormality in the function or structure of the organs involved in swallowing or those involved in swallowing, breathing, and speech interaction.

Dysphagia affects up to 22% of adults in the primary care setting and is more likely in older adults. Adults over age 65 may account for up to two-thirds of all people with dysphagia. Although the aging process is associated with neuromuscular changes, aging itself does not typically cause clinically significant dysphagia. However, aging is associated with an increased prevalence of neuromuscular and degenerative disorders that can cause dysphagia, therefore the presence of dysphagia should prompt evaluation. It is also important to note that a person may have a swallowing problem but not be symptomatic. In one study of 2,000 patients evaluated with videofluoroscopic examinations, 51% of patients were found to aspirate; however, of those who aspirated, 55% demonstrated silent aspiration with an absent protective cough reflex.

Dysphagia can be caused by functional or structural abnormalities of the oral cavity, pharynx, esophagus, or even the gastric cardia. Many patients with dysphagia can subjectively localize a sensation of blockage or discomfort to the throat or to the retrosternal region. Patients with pharyngeal dysphagia typically complain of food sticking in the throat or of a globus sensation with a lump in the throat. Other symptoms of oropharyngeal dysfunction include coughing or choking during swallowing (due to laryngeal penetration or aspiration), a nasal-quality voice or nasal regurgitation (due to soft-palate insufficiency), food dribbling from the mouth, and difficulty initiating a swallow or chewing (due to an abnormal oral phase of swallowing). It also is important to recognize that abnormalities of the mid or distal esophagus or even the gastric cardia may cause referred dysphagia to the upper chest or pharynx, whereas abnormalities of the pharynx rarely cause referred dysphagia to the lower chest. Therefore, the esophagus and cardia should be evaluated in patients with pharyngeal symptoms, particularly if no abnormalities are found in the pharynx to explain these symptoms. Other patients may have retrosternal dysphagia with a sensation of blockage or discomfort anywhere from the thoracic inlet to the xiphoid process. This symptom may be caused by esophageal motility disorders or by structural abnormalities of the esophagus or cardia such as esophagitis, rings, strictures, or tumors.

Overview of Imaging Modalities

Radiologic evaluation in patients with dysphagia should be tailored to assess the oral cavity, pharynx, esophagus, and/or gastric cardia based on the level of clinical suspicion. Fluoroscopy remains the imaging modality of choice to evaluate dysphagia. Fluoroscopic studies can be used to assess pharyngeal function and esophageal motility while simultaneously assessing for structural disorders including webs, rings, strictures, extrinsic mass effect, and tumors.

Overall, the test choice may depend on the nature and location of the patient's dysphagia as well as the clinical setting. For example, in the immediate postoperative scenario, the preferred method of radiographic evaluation may be a single contrast study using water-soluble contrast such as diatrizoate meglumine and diatrizoate sodium solution (Gastrografin®) or iohexol (Omnipaque®), rather than barium sulfate.

X-ray Pharynx, Including Dynamic and Static Imaging

A biphasic examination of the esophagus and pharynx is performed (similar to a biphasic esophagram) by acquiring static and dynamic images of the pharynx. In addition to double- and single-contrast images of the pharynx, videofluoroscopy of swallowing phases aids in the evaluation of swallowing disorders. Pharyngeal function and esophageal motility are also assessed.

X-ray Modified Barium Swallow

A modified barium swallow is a videofluoroscopic procedure performed in conjunction with a speech therapist to evaluate a patient's oropharyngeal swallow and to examine the effectiveness of rehabilitation strategies. The modified barium swallow uses videofluoroscopy to focus on the oral cavity, pharynx, and cervical esophagus to assess for oral and pharyngeal swallowing phases abnormalities. Various barium suspensions and consistencies may be used, and compensatory maneuvers (e.g., head position changes and breathing techniques) may be attempted to prevent aspiration or improve other types of swallowing dysfunction.

X-ray Barium Swallow—Single-Contrast Esophagram

A single-contrast esophagram or barium swallow includes full-column distension, mucosal relief views, and fluoroscopic observation. Single-

contrast technique allows for the assessment of esophageal and pharyngeal function and motility. Evaluation of mucosal detail is superior with double-contrast technique; however, single-contrast studies are well-suited for elderly, debilitated, obese, and postoperative patients as well as patients who are unable to fully cooperate with the biphasic examination.

X-ray Biphasic Esophagram

A biphasic fluoroscopic evaluation of the pharynx and esophagus includes single- and double-contrast techniques, including full-column, mucosal relief, and double-contrast views of the esophagus. Esophageal function and motility are evaluated at fluoroscopy. Double-contrast technique provides more mucosal detail compared with the single-contrast technique. Additionally, sensitivity to detect mucosal disease is highest with the double-contrast techniques. However, patient cooperation and mobility are required.

Technetium (Tc)-99m Transit Scintigraphy Esophagus

Nuclear scintigraphy may be useful to assess esophageal transit. Tc-99m labeled substances may be mixed in liquid, semisolid, or solid form and swallowed in conjunction with dynamic image acquisition. This examination could be used to assess for motility abnormalities or gastroesophageal reflux. Other possible diagnostic tests to evaluate patients with dysphagia include endoscopy and manometry. Dynamic magnetic resonance (MR) imaging acquired during swallowing (MR fluoroscopy) can assess swallowing function, esophageal motility, and the function and morphology of the gastroesophageal junction without ionizing radiation. Dynamic computed tomography to assess swallowing has also been reported. However, the use of these modalities to evaluate dysphagia has not yet been widely accepted.

Discussion of Imaging Modalities by Variant

Optimal evaluation of patients with dysphagia depends on the nature and location of the dysphagia and the clinical setting. For example, when oropharyngeal dysphagia has an attributable cause (e.g., recent stroke), a modified barium swallow with different bolus consistencies may be the appropriate test to assess the patient's swallowing status and initiate treatment by a speech therapist. Patients with unexplained oropharyngeal dysphagia, however, may need a more detailed barium study to determine the cause. Also, because abnormalities of the distal esophagus or gastric cardia can cause referred sensation of dysphagia in the upper chest or pharynx, the esophagus and cardia should be evaluated in patients with pharyngeal symptoms, and a combined radiologic examination of the oral cavity, pharynx, esophagus, and gastric cardia is appropriate for patients with unexplained pharyngeal dysphagia.

Patients with retrosternal dysphagia experience a sensation of blockage or discomfort at any level between the thoracic inlet and the xiphoid process. Because retrosternal dysphagia can be caused by esophageal motility disorders or by structural abnormalities of the esophagus or cardia (i.e., esophagitis, rings, strictures, or tumors) a biphasic esophagram is the preferable procedure. Biphasic barium examination includes upright double-contrast views with a high-density barium suspension to assess mucosal disease as well as prone single-contrast views with a low-density barium suspension to assess distensibility and motility and to evaluate for the presence of a hiatal hernia.

Four scenarios are considered separately:

1. Oropharyngeal dysphagia with an attributable cause
2. Unexplained oropharyngeal dysphagia
3. Retrosternal dysphagia in immunocompetent patients
4. Retrosternal dysphagia in immunocompromised patients

Oropharyngeal Dysphagia with an Attributable Cause

When oropharyngeal dysphagia has an attributable cause (e.g., recent stroke, worsening dementia, myasthenia gravis, amyotrophic lateral sclerosis), there is a high index of suspicion for swallowing dysfunction, and modified barium swallow is the study of choice. The risk of developing aspiration pneumonia is directly related to the degree of swallowing dysfunction on videofluoroscopic studies.

A modified barium swallow may be performed with the assistance of a speech therapist; in that case, the study is facilitated by examining the patient in a speech therapy chair. The modified barium swallow focuses on the oral cavity, pharynx, and cervical esophagus with videofluoroscopy to assess abnormalities of both the oral phase of swallowing (i.e., difficulty propelling the bolus) and the pharyngeal phase (i.e., laryngeal penetration, tracheal aspiration, cricopharyngeal dysfunction). Dynamic evaluation of swallowing function can assess bolus manipulation, tongue motion, hyoid, laryngeal, and pharyngeal elevation, soft-palate elevation, pharyngeal constrictor motion, epiglottic tilt, laryngeal penetration, and cricopharyngeus muscle function. The patient may be given high-density or low-density barium suspensions as well as other substances of varying consistency (e.g., barium paste or barium-impregnated crackers) to assess the patient's ability to swallow solid or semisolid substances. In conjunction with a speech therapist, various compensatory maneuvers (e.g., a chin-tuck position) may be attempted to prevent aspiration or improve other types of swallowing dysfunction.

The x-ray evaluation of the pharynx with dynamic and static imaging may also evaluate swallowing function; however, this examination typically does not involve a variety of barium consistencies and does not include an evaluation of therapeutic options. Biphasic or single-contrast examinations may be used to diagnose aspiration or penetration and structural abnormalities; however, these studies do not allow for a detailed evaluation of swallowing function. Nuclear scintigraphy is usually not indicated in this clinical scenario.

Unexplained Oropharyngeal Dysphagia

In patients with unexplained oropharyngeal dysphagia, a more detailed barium study may be performed to assess both functional and structural abnormalities of the pharynx (i.e., x-ray pharynx with dynamic and static imaging). As in the modified barium swallow, a dynamic examination of the pharynx with videofluoroscopy permits assessment of the oral and pharyngeal swallowing phases. However, static images of the pharynx (e.g., double-contrast spot films of the pharynx in frontal and lateral projections with high-density barium) should also be obtained to detect structural abnormalities (e.g., pharyngeal tumors, Zenker diverticulum). Because some patients with lesions in the esophagus or at the gastric cardia can have referred dysphagia, the esophagus and cardia should also be carefully evaluated as part of the barium study, particularly if no abnormalities are found in the pharynx to account for patients' symptoms. In addition, patients with pharyngeal carcinomas have a significantly increased risk of synchronous esophageal carcinomas; complete examination of the esophagus should be performed once a pharyngeal tumor is identified.

In patients with unexplained pharyngeal dysphagia, the combination of videofluoroscopy and static images of the pharynx and esophagus has a higher diagnostic value than either videofluoroscopy (such as a modified barium swallow) or static images (such as a biphasic or single-contrast esophagram) alone. If a study is performed using solely static imaging, a biphasic study is preferable to a single-contrast barium swallow due to its superior depiction of mucosal processes.

Retrosternal Dysphagia in Immunocompetent Patients

The biphasic esophagram is a valuable technique for evaluating retrosternal dysphagia in immunocompetent patients. This technique permits detection of both structural and functional abnormalities of the esophagus. Structural lesions include esophagitis, strictures, rings, and carcinoma. Functional abnormalities of the esophagus include reflux and motility disorders.

The most important structural lesion is carcinoma of the esophagus or esophagogastric junction. In one study, biphasic esophagography was found to have 96% sensitivity in diagnosing cancer of the esophagus or esophagogastric junction, comparable to the reported sensitivity of endoscopy for diagnosing these lesions. In 2 other large patient series, endoscopy failed to reveal any cases of esophageal carcinoma that had been missed on the barium studies. The findings in these series suggest that endoscopy is not routinely warranted to rule out missed tumors in patients who have normal findings on radiologic examinations.

Although double-contrast views best detect mucosal lesions (e.g., tumors, esophagitis), prone single-contrast views of patients who continuously drink a low-density barium suspension best detect lower esophageal rings or strictures. Lower esophageal rings are 2 to 3 times more likely to be diagnosed on prone single-contrast views than on upright double-contrast views because of inadequate distention of the distal esophagus when the patient is upright. In one study, the biphasic esophagram was found to depict about 95% of all lower esophageal rings, whereas endoscopy detected only 76% of these rings. Similarly, biphasic esophagrams have been found to have a sensitivity of about 95% for the detection of peptic strictures, sometimes revealing strictures that are missed with endoscopy.

The biphasic esophagram is also a useful test in patients with esophageal motility disorders causing dysphagia. Videofluoroscopy of discrete swallows of a low-density barium suspension in the prone right antero-oblique position permits detailed assessment of esophageal motility. In various studies, videofluoroscopy has been found to have an overall sensitivity of 80% to 89% and specificity of 79% to 91% for diagnosing esophageal motility disorders (e.g., achalasia, diffuse esophageal spasm) compared with esophageal manometry. Occasionally, barium studies may even reveal dysmotility not seen at manometry (e.g., some patients with the beak-like distal esophageal narrowing of achalasia are found to have complete relaxation of the lower esophageal sphincter on manometry). In any case, when a significant esophageal motility disorder is detected on a barium study, manometry may be performed to further elucidate the nature of this motility disorder.

Although the biphasic esophagram provides superior mucosal detail, allowing for earlier detection of subtle lesions, patient cooperation and mobility are required. For debilitated, immobile patients or patients who are limited in their ability to cooperate, a single-contrast esophagram may be necessary.

For patients with retrosternal dysphagia, the entire esophagus and the gastric cardia should be assessed. Therefore, modified barium swallow and dynamic imaging of the pharynx (x-ray pharynx dynamic and static imaging) may not be appropriate.

Known or suspected achalasia (pretreatment or post-treatment) is a subcategory within the "Retrosternal dysphagia in the immunocompetent patient" section of text. Specific protocols to assess esophageal emptying are useful. It should be determined that the patient does not aspirate thin liquids before he or she is given large quantities of barium. Alternatively, radionuclide esophageal transit scintigraphy is a simple, noninvasive, and

quantitative test of esophageal emptying.

Endoscopy performed to evaluate the esophagus for structural abnormalities in patients with dysphagia is a highly accurate test for esophageal cancer when multiple endoscopic biopsy specimens and brushings are obtained. It also is more sensitive than double-contrast esophagography for detecting mild reflux esophagitis or other subtle forms of esophagitis. However, endoscopy is a more expensive and invasive test than the barium study. It also is less sensitive than the barium study for detecting lower esophageal rings or strictures and does not permit evaluation of esophageal motility disorders. For these reasons, the barium study is often recommended, even by gastroenterologists, as the initial diagnostic test for patients with dysphagia.

Retrosternal Dysphagia in Immunocompromised Patients

The major consideration in immunocompromised patients with dysphagia or odynophagia (painful swallowing) is infectious esophagitis, most commonly due to *Candida albicans* or herpes simplex virus. In human immunodeficiency virus (HIV)-positive patients, *Candida* is most often the cause of esophageal symptoms; cytomegalovirus (CMV), herpes simplex, and idiopathic ulcers (also known as HIV ulcers) are the other most common etiologies. HIV-positive patients with esophageal symptoms may be treated empirically with antifungal therapy without first undergoing a diagnostic examination. However, most gastroenterologists prefer that those who have severe symptoms at presentation or persistent symptoms be evaluated by endoscopy. Endoscopy is preferred because of the ability to obtain specimens (e.g., histology, cytology, immunostaining, or culture). The endoscopic or radiographic appearance alone usually does not accurately predict diseases other than *Candida* esophagitis; diagnosis requires specimen acquisition for laboratory study.

Esophagography is preferred by some as an initial diagnostic study and can be useful in guiding management. Biphasic esophagography is more accurate than single-contrast esophagography for detecting ulcers or plaques associated with infectious esophagitis. However, a single-contrast esophagram may be performed if the patient is too sick or debilitated to tolerate a double-contrast examination. Patients with radiographically diagnosed *Candida* or herpes esophagitis may be treated with antifungal or antiviral agents respectively, without endoscopic evaluation. Endoscopy is warranted for patients with giant esophageal ulcers to differentiate CMV and HIV and begin appropriate therapy.

Dynamic evaluation of swallowing function, as with modified barium swallow or x-ray pharynx with dynamic and static views may not be necessary in this clinical scenario, and a modified barium swallow may fail to reveal the diagnosis. Nuclear scintigraphy evaluates esophageal transit and is likely not indicated in this scenario.

Summary

- If there is an attributable cause for oropharyngeal dysphagia, a modified barium swallow study is recommended. Various barium suspensions and consistencies may be used. With the assistance of a speech therapist, compensatory maneuvers can be attempted.
- If oropharyngeal dysphagia is unexplained, a more detailed barium study should be performed incorporating a combination of videofluoroscopy and static images of the pharynx and esophagus with evaluation made of the pharynx, esophagus, and gastric cardia.
- When assessing retrosternal dysphagia in immunocompetent patients, the biphasic esophagram is the imaging study of choice. Double-contrast views best detect mucosal lesions, whereas single-contrast views best detect lower esophageal rings or strictures and assess motility.
- In immunocompromised patients with retrosternal dysphagia, a biphasic examination is necessary to detect more subtle changes of infectious pharyngoesophagitis. However, endoscopy allows for biopsy and culture to further direct management.

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
⊕	<0.1 mSv	<0.03 mSv
⊕ ⊕	0.1-1 mSv	0.03-0.3 mSv
⊕ ⊕ ⊕	1-10 mSv	0.3-3 mSv
⊕ ⊕ ⊕ ⊕	10-30 mSv	3-10 mSv
⊕ ⊕ ⊕ ⊕ ⊕	30-100 mSv	10-30 mSv

*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies".

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

Dysphagia

Guideline Category

Diagnosis

Evaluation

Clinical Specialty

Family Practice

Gastroenterology

Infectious Diseases

Internal Medicine

Neurology

Nuclear Medicine

Radiology

Speech-Language Pathology

Intended Users

Health Plans

Hospitals

Managed Care Organizations

Physicians

Speech-Language Pathologists

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of initial radiologic examinations for patients with dysphagia

Target Population

Patients with dysphagia

Interventions and Practices Considered

1. X-ray
 - Barium swallow single contrast
 - Barium swallow modified
 - Dynamic and static imaging of pharynx
 - Biphasic esophagram (double contrast and single contrast)
2. Technetium (Tc)-99m esophageal transit scintigraphy

Major Outcomes Considered

Utility of initial radiologic examinations for patients with dysphagia

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Procedure

Staff will search in PubMed only for peer reviewed medical literature for routine searches. Any article or guideline may be used by the author in the narrative but those materials may have been identified outside of the routine literature search process.

The Medline literature search is based on keywords provided by the topic author. The two general classes of keywords are those related to the condition (e.g., ankle pain, fever) and those that describe the diagnostic or therapeutic intervention of interest (e.g., mammography, MRI).

The search terms and parameters are manipulated to produce the most relevant, current evidence to address the American College of Radiology Appropriateness Criteria (ACR AC) topic being reviewed or developed. Combining the clinical conditions and diagnostic modalities or therapeutic procedures narrows the search to be relevant to the topic. Exploding the term "diagnostic imaging" captures relevant results for diagnostic topics.

The following criteria/limits are used in the searches.

- Articles that have abstracts available and are concerned with humans.
- Restrict the search to the year prior to the last topic update or in some cases the author of the topic may specify which year range to use in the search. For new topics, the year range is restricted to the last 10 years unless the topic author provides other instructions.
- May restrict the search to Adults only or Pediatrics only.
- Articles consisting of only summaries or case reports are often excluded from final results.

The search strategy may be revised to improve the output as needed.

Number of Source Documents

The total number of source documents identified as the result of the literature search is not known.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Strength of Evidence Key

Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis and results.

Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.

Category 3 - The conclusions of the study may be valid but the evidence supporting the conclusions is inconclusive or equivocal.

Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The topic author drafts or revises the narrative text summarizing the evidence found in the literature. American College of Radiology (ACR) staff draft an evidence table based on the analysis of the selected literature. These tables rate the strength of the evidence (study quality) for each article included in the narrative text.

The expert panel reviews the narrative text, evidence table, and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the table. Each individual panel member assigns a rating based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development document (see the "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

Rating Appropriateness

The appropriateness ratings for each of the procedures included in the Appropriateness Criteria topics are determined using a modified Delphi methodology. A series of surveys are conducted to elicit each panelist's expert interpretation of the evidence, based on the available data, regarding the appropriateness of an imaging or therapeutic procedure for a specific clinical scenario. American College of Radiology (ACR) staff distribute surveys to the panelists along with the evidence table and narrative. Each panelist interprets the available evidence and rates each procedure. The surveys are completed by panelists without consulting other panelists. The appropriateness rating scale is an ordinal scale that uses integers from 1 to 9 grouped into three categories: 1, 2, or 3 are in the category "usually not appropriate"; 4, 5, or 6 are in the category "may be appropriate"; and 7, 8, or 9 are in the category "usually appropriate." Each panel member assigns one rating for each procedure for a clinical scenario. The ratings assigned by each panel member are presented in a table displaying the frequency distribution of the ratings without identifying which members provided any particular rating.

If consensus is reached, the median rating is assigned as the panel's final recommendation/rating. Consensus is defined as eighty percent (80%) agreement within a rating category. A maximum of three rounds may be conducted to reach consensus. Consensus among the panel members must be achieved to determine the final rating for each procedure.

If consensus is not reached, the panel is convened by conference call. The strengths and weaknesses of each imaging procedure that has not reached consensus are discussed and a final rating is proposed. If the panelists on the call agree, the rating is proposed as the panel's consensus. The document is circulated to all the panelists to make the final determination. If consensus cannot be reached on the call or when the document is

circulated, "No consensus" appears in the rating column and the reasons for this decision are added to the comment sections.

This modified Delphi method enables each panelist to express individual interpretations of the evidence and his or her expert opinion without excessive influence from fellow panelists in a simple, standardized and economical process. A more detailed explanation of the complete process can be found in additional methodology documents found on the [ACR Web site](#) (see also the "Availability of Companion Documents" field).

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on analysis of the current literature and expert panel consensus.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Selection of appropriate radiologic imaging procedures for diagnosis and evaluation of patients with dysphagia

Potential Harms

Relative Radiation Level (RRL)

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are low as compared to those specified for adults. Additional information regarding radiation dose assessment for imaging examinations can be found in the American College of Radiology (ACR) Appropriateness Criteria® Radiation Dose Assessment Introduction document (see the "Availability of Companion Documents" field).

Qualifying Statements

Qualifying Statements

The American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Carucci LR, Lalani T, Rosen MP, Cash BD, Katz DS, Kim DH, Small WC, Smith MP, Yaghmai V, Yee J, Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® dysphagia. [online publication]. Reston (VA): American College of Radiology (ACR); 2013. 10 p. [42 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1998 (revised 2013)

Guideline Developer(s)

American College of Radiology - Medical Specialty Society

Source(s) of Funding

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

Guideline Committee

Committee on Appropriateness Criteria, Expert Panel on Gastrointestinal Imaging

Composition of Group That Authored the Guideline

Panel Members: Laura R. Carucci, MD (*Principal Author*); Tasneem Lalani, MD (*Co-Author and Panel Vice-chair*); Max P. Rosen, MD, MPH (*Panel Chair*); Brooks D. Cash, MD; Douglas S. Katz, MD; David H. Kim, MD; William C. Small, MD, PhD; Martin P. Smith, MD; Vahid Yaghmai, MD, MS; Judy Yee, MD

Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Jones B, Gayler BW, Rosen MP, Blake MA, Baker ME, Cash BD, Fidler JL, Grant TH, Greene FL, Katz DS, Lalani T, Miller FH, Small WC, Sudakoff GS, Warshauer DM, Yee J, Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® dysphagia. [online publication]. Reston (VA): American College of Radiology (ACR); 2010. 6 p.

Guideline Availability

Electronic copies: Available from the [American College of Radiology \(ACR\) Web site](#) .

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

Availability of Companion Documents

The following are available:

- ACR Appropriateness Criteria®. Overview. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available in Portable Document Format (PDF) from the [American College of Radiology \(ACR\) Web site](#) .
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 2013 Apr. 1 p. Electronic copies: Available in Portable Document Format (PDF) from the [ACR Web site](#) .
- ACR Appropriateness Criteria®. Evidence table development – diagnostic studies. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available in PDF from the [ACR Web site](#) .

- ACR Appropriateness Criteria®. Radiation dose assessment introduction. Reston (VA): American College of Radiology; 2013 Nov. 2 p. Electronic copies: Available in PDF from the [ACR Web site](#) .
- ACR Appropriateness Criteria®. Procedure information. Reston (VA): American College of Radiology; 2013 Nov. 1 p. Electronic copies: Available in PDF from the [ACR Web site](#) .
- ACR Appropriateness Criteria® dysphagia. Evidence table. Reston (VA): American College of Radiology; 2013. 9 p. Electronic copies: Available from the [ACR Web site](#) .

Patient Resources

None available

NGC Status

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